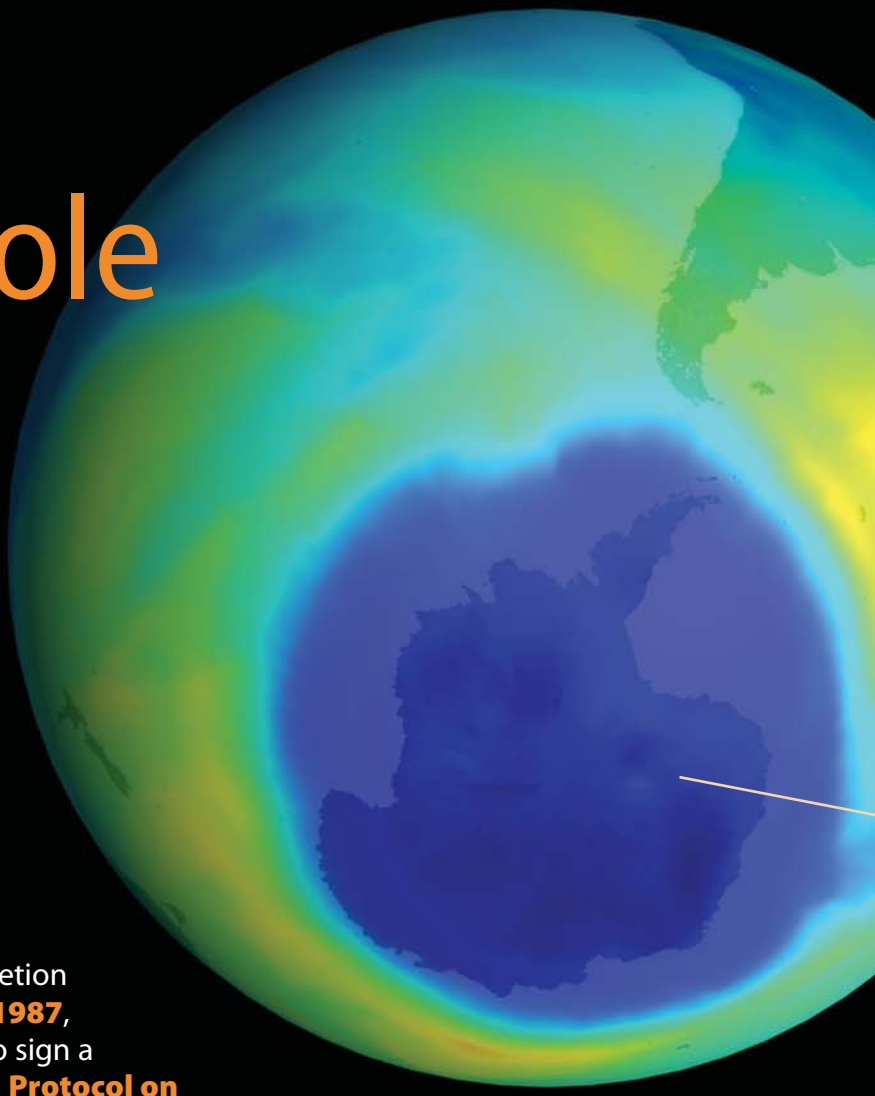
A C H I E V E

OVER THE PAST SEVERAL DECADES, EPA'S STRATOSPHERIC PROTECTION DIVISION AND ITS PARTNERS HAVE MADE SIGNIFICANT STRIDES TO PROTECT THE EARTH'S STRATOSPHERIC OZONE LAYER, THE ENVIRONMENT, AND PEOPLE'S HEALTH.

Healing the Ozone Hole

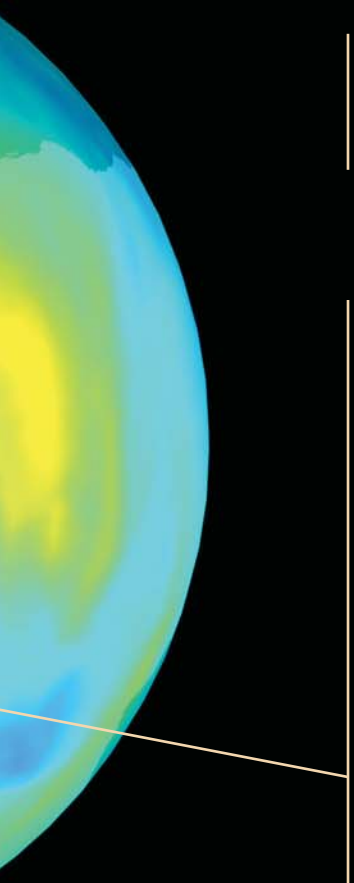


The ozone layer acts like a shield in the upper atmosphere (the stratosphere), to protect life on Earth from harmful ultraviolet (UV) radiation. In **1974**, scientists discovered that emissions of chlorofluorocarbons, or CFCs, were depleting ozone in the stratosphere. CFCs were a common aerosol propellant in spray cans and were also used as refrigerants, solvents, and foam-blowing agents.

In the **1980s**, scientists observed a thinning of the ozone layer over Antarctica, and people began thinking of it as an "ozone hole." Additional research has shown that ozone depletion occurs over every continent.

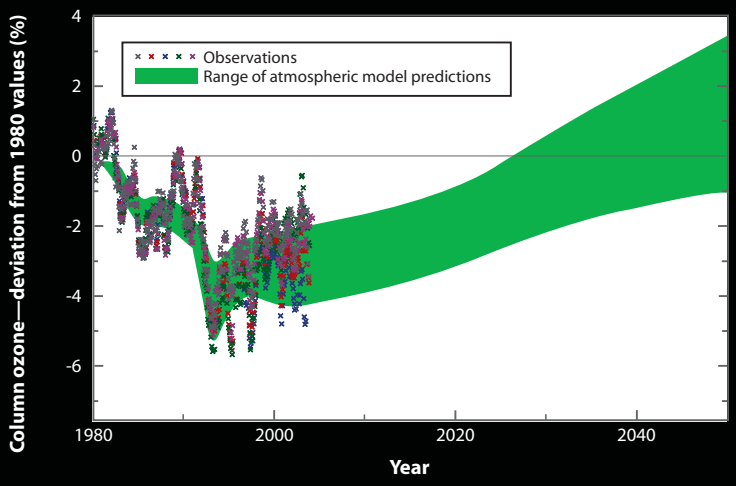
As our scientific knowledge about ozone depletion grew, so too did the response to the issue. In **1987**, leaders from many countries came together to sign a landmark environmental treaty, the **Montreal Protocol on Substances That Deplete the Ozone Layer**. Today, more than 190 countries—including the United States—have ratified the treaty. These countries are committed to taking action to reduce the production and use of CFCs and other ozone depleting substances to protect the ozone layer. Countries are phasing out the production and consumption of ozone depleting substances in groups, focusing on those chemicals with the most ozone depleting potential first, followed by those that pose the next greatest ozone depletion risk (in this document, these chemicals are referred to as "first-generation" and "second-generation" substances, respectively).

M E N T S



Sustained recovery of the ozone layer will require worldwide phase-out of ozone-depleting substances.

Global Ozone Depletion and Recovery



Source: Intergovernmental Panel on Climate Change/Technology and Economic Assessment Panel. Special Report on Safeguarding the Ozone Layer and the Global Climate System: Issues Related to Hydrofluorocarbons and Perfluoro carbons. (Cambridge: Cambridge University Press, 2005.) Figure SPM-3.

The ozone layer has not grown thinner since 1998 over most of the world, and it appears to be recovering because of reduced emissions of ozone-depleting substances. Antarctic ozone is projected to return to pre-1980 levels by 2060 to 2075.

OZONE: GOOD UP HIGH, BAD NEARBY

Ozone is a gas that occurs both in the Earth's upper atmosphere (the stratosphere) and at ground level. Ozone can be "good" or "bad" for people's health and the environment, depending on its location in the atmosphere.

"Good" ozone is produced naturally in the stratosphere and is "good" because it blocks harmful UV radiation from reaching the Earth's surface where it can harm people and ecosystems.

"Bad" ozone is an air pollutant found at ground level and is "bad" because it is harmful to breathe and can damage crops, trees, and other vegetation. Ground-level ozone is a main component of urban smog.

For more information, see: <www.epa.gov/oar/oaqps/gooduphigh>.

Saving Lives

We care about ozone depletion because a thinner ozone layer allows more UV radiation to reach the Earth's surface. Overexposure to UV radiation can cause a range of health effects, including skin damage (skin cancers and premature aging), eye damage (including cataracts), and suppression of the immune system. Researchers believe that overexposure to UV radiation is contributing to an increase in melanoma, the most fatal of all skin cancers.

* U.S. Environmental Protection Agency, Office of Air and Radiation. November 1999. The Benefits and Costs of the Clean Air Act, 1990-2010. EPA 4W-R-99-001. www.epa.gov/air/sect812/prospective1.html.

Protecting the Planet

UV radiation can damage sensitive crops, such as soybeans, and reduce crop yields. Some scientists believe that marine phytoplankton, which serve as the base of the ocean food chain, are already under stress from UV radiation. This stress could have profound effects on the food chain and on food productivity.

Additionally, since most ozone depleting substances are also potent greenhouse gases, replacing these substances with alternatives that are safer for the ozone layer can also reduce greenhouse gas emissions and slow climate change.

Phasing out ozone-depleting substances has already reduced greenhouse gas emissions by more than 8,900 million metric tons of carbon equivalent (MMTCE) per year*—equivalent to the cumulative carbon dioxide emissions associated with…

Generating enough electricity to power every U.S. home for more than 13 years…

And

Preserving 89 million acres of forests from deforestation—more than twice the size of Florida…

And

Saving more than 1.2 trillion gallons of gas—enough to make 4.8 billion round trips from New York to Los Angeles by car.‡

* U.S. Environmental Protection Agency, Stratospheric Protection Division, Allowance Tracking System, 1989-1995.

‡ Calculations made using U.S. Climate Technology Cooperation Gateway tool at www.usctcgateway.net.

Everyone Benefits

Protecting the ozone layer has enormous benefits for the United States.

Because stratospheric ozone depletion is a global issue, people in other countries also benefit from the investments we make in technology and sound science to protect the ozone layer. In turn, we benefit from the accomplishments of other nations.

Every dollar invested in ozone protection provides $20 of societal health benefits in the United States.*

Efforts to protect the stratospheric ozone layer will produce an estimated

$4.2 trillion in societal health benefits

in the United States over the period 1990 to 2165.*

* U.S. Environmental Protection Agency, Office of Air and Radiation. November 1999. The Benefits and Costs of the Clean Air Act, 1990-2010. EPA 4W-R-99-001. www.epa.gov/air/sect812/prospective1.html.